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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,015	12/31/2003	Eric W. McFarland	500451-1005	9328

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EXAMINER

DIAMOND, ALAN D

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 11/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/750,015

Applicant(s)

MCFARLAND, ERIC W.

Examiner

Alan Diamond

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 31 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 97-128 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 97-128 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Specification***

1. The disclosure is objected to because of the following informalities: The instant specification lacks a sentence at the beginning that refers to the instant parent application (i.e., 10/057,223 filed 01/25/2002) and provision application (i.e., 60/287,205 filed 04/27/2001) from which the instant application claims benefit. For example, on page 2, before the heading "Technical Field", the following statement should be made: "This application is a continuation of Serial No. 10/057,223 filed 01/25/2002 now U.S. Patent 6,774,300, which claims the benefit of provisional application 60/287,205 filed 04/27/2001." On page 23, at line 15, the "9" should be changed to the lower case letter "o". Appropriate correction is required.

### ***Claim Objections***

2. Claim 112 is objected to because of the following informalities: In claim 112, at the last line of the claim, the number "0" should be changed to the lower case letter "o". Appropriate correction is required.

### ***Double Patenting***

3. Applicant is advised that should claim 107 be found allowable, claim 108 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

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4. Applicant is advised that should claim 125 be found allowable, claims 126 and 127 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof.

When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

5. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

6. Claim 97-102, 105, 107-110 are rejected under 35 U.S.C. 101 as claiming the same invention as that of claims 1-6, 9, and 11-13 of prior U.S. Patent No. 6,774,300.

This is a double patenting rejection.

Instant claims 97-102, 105, and 107-109 recite that the conducting layer comprises an ultra-thin metal film, and that the conducting layer provides ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer. In claims 1-6, 9, 11, and 12 of said patent, the conducting layer comprises an ultra-thin metal film for providing ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer. However, in the instant claims, if the conducting layer provides ballistic transport, then the ultra-thin metal film

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must inherently be for providing ballistic transport, as in patented claims 1-6, 9, 11, and 12. If the instant ultra-thin metal film did not provide ballistic transport between the light energy conversion layer and the charge separation layer, then the instant conducting layer could not provide this ballistic transport. Likewise, if the ultra-thin metal film in the claims of said patent is for providing the ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer, then the conducting layer in the claims of said patent must inherently provide ballistic transport. The conducting layer in the claims of said patent is between the light energy conversion layer and the charge separation layer and must provide ballistic transport if the ultra-thin metal film of the conducting layer provides ballistic transport. Of course, the instant conducting layer could comprise other layers, but so could the conducting layer in the claims of said patent. Accordingly, although there is a slight difference in wording between instant claims 97-102 and 105, 107-109 and patented claims 1-6, 9, 11, and 12, based on inherency, there is no difference in scope, i.e., the claims encompass the same subject matter.

The Examiner acknowledges that instant claim 110 is slightly different in wording from claim 13. Claim 110 recites, at lines 4-5 "a two sided conducting layer comprising an ultra-thin metal film and having the light energy conversion layer secured to a first side thereof" and also recites at lines 8-9 that "the conducting layer comprises an ultra-thin metal film for providing ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer". However, as far as the Examiner is concerned, there is no difference between the ultra-thin metal film at lines 4 and 8 of

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said claim 110. In said claim 13, "the conducting layer comprises an ultra-thin metal film for providing ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer" just as at lines 8-9 of said claim 110. Since there is no difference between the ultra-thin metal film at lines 4 and 8 of said claim 110, then there is no difference between claims 110 and 13.

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 103, 104, 106, and 111-128 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-60 of U.S. Patent No. 6,774,300. Although the conflicting claims are not identical, they are not patentably distinct for the following reasons:

Instant claims 103, 104, and 106 are anticipated by, but are of a different scope from claims 7, 8, and 10 of said patent because instant claims 103, 104, and 106 recite that the conducting layer comprises an ultra-thin metal film, whereas claims 7, 8, and 10 recite a conducting layer. The conducting layer in instant claims 103, 104, and 106 and the conducting layer in claims 7, 8, and 10 of said patent provide ballistic transport of

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charge carriers from the light energy conversion layer to the charge separation layer.

However, in view of many of the other claims in said patent, such as claims 1-6, etc, the use of a conducting layer comprising an ultra-thin metal film would have been well within the skill of an artisan practicing the invention in the claims of said patent.

Note that claims 14-29 of said patent are anticipatory of instant claims 111-128, but are of a different scope since instant claims 111-128 recite a "back contact" whereas the claims 14-29 of said patent recite a "metal back contact".

9. Claims 97, 98, 103-106, 111, 114, 115, 118, 119, and 122-124 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3, 5, 7, 8, 13-19, 21, 23, 25, 31, 33-37, 42, 47, 50-56, 59, and 97-101 of copending Application No. 10/645,747.

With respect to instant claims 97, 98, 105, 111, 114, 115, 118, 119, 122, and 123, claim 31 of said copending application lacks the instant Schottky barrier for the conducting layer and charge separation layer. However, this feature would have been within the skill of an artisan in view of claim 18 of said copending application.

With respect to instant claims 98, 118, and 119, it is noted that, for example, claim 7 and 8 of said copending application have a plurality of photosensitive structures, which it is the Examiner's position, will maximize capture of incident light.

With respect to claim 103, it is noted that a metal-insulator-metal junction would be present in claim 25 of said copending application when the conducting layer is metal and the charge separation layer is insulator deposited on metal.

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The further semiconductor layer of instant claim 104 is disclosed in claim 55 of said copending application.

With respect to claims 105, 122, and 123, the claims of said copending application are not limited to any particular semiconductor material for the charge separation layer, and thus, any semiconductor material, such as an organic semiconductor material, would have been within the skill of an artisan. An organic semiconductor in claim 33 of said copending application would have an insulator formed on an organic semiconductor, as per said claim 123.

With respect to claims 106 and 124, the use of an insulator/semiconductor multi-layer for the charge separation layer would have been within the skill of an artisan in view of claims 21 and 33, which recite that the conducting layer and the charge separation layer define a metal-insulator-semiconductor junction. The metal-insulator-semiconductor junction is multi-layer and includes insulator-semiconductor.

With respect to claims 114 and 115, it is noted that claim 99 of said copending application teaches nanostructures that encompass the instant nanoclusters and nanostructures.

This is a provisional obviousness-type double patenting rejection.

10. Claims 97-109 and 111-127 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3, 5, 7, 8, 13-19, 21, 23, 25, 31, 33-37, 42, 47, 50-56, 59, and 97-101 of copending Application No. 10/645,747 in view of Han et al, U.S. Patent 6,150,605.



With respect to instant claims 97-102, 105, 107-109, 111-123, and 125-127, claim 31 of said copending application lacks the instant Schottky barrier for the conducting layer and charge separation layer. However, this feature would have been within the skill of an artisan in view of claim 18 of said copending application.

With respect to instant claims 98, 118, and 119, it is noted that, for example, claim 7 and 8 of said copending application have a plurality of photosensitive structures, which it is the Examiner's position, will maximize capture of incident light.

With respect to claim 103, it is noted that a metal-insulator-metal junction would be present in claim 25 of said copending application when the conducting layer is metal and the charge separation layer is insulator deposited on metal.

The further semiconductor layer of instant claim 104 is disclosed in claim 55 of said copending application.

With respect to claims 105, 122, and 123, the claims of said copending application are not limited to any particular semiconductor material for the charge separation layer, and thus, any semiconductor material, such as an organic semiconductor material, would have been within the skill of an artisan. An organic semiconductor in claim 33 of said copending application would have an insulator formed on an organic semiconductor, as per said claim 123.

With respect to claims 106 and 124, the use of an insulator/semiconductor multi-layer for the charge separation layer would have been within the skill of an artisan in view of claims 21 and 33, which recites that the conducting layer and the charge

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separation layer define a metal-insulator-semiconductor junction. The metal-insulator-semiconductor junction is multi-layer and includes insulator-semiconductor.

With respect to claims 114 and 115, it is noted that claim 99 of said copending application teaches nanostructures that encompass the instant nanoclusters and nanostructures.

The claims of said copending application do not specifically teach a patterned light energy conversion layer as per instant claims 99 and 120, a porous light energy conversion layer and charge separation layer as per instant claims 100, 101, and 121, a structured charge separation layer as per instant claim 102, a charge separation layer and a light energy conversion layer that are formed from template molecules as per instant claims 107-109 and 125-127, or a light energy conversion layer that includes merbromin, o-phenylxanthene, iron cyanate, or organic dye, as per instant claims 112, 113, 116, and 117.

Han teaches a photovoltaic cell comprising a porous photovoltaic layer (3) that reads on the instant light energy conversion layer; an electrically conductive film (5) that, it is the Examiner's position, reads on the instant conducting layer, and that can be made from, for example, a solid polymer electrolyte; and a second porous photovoltaic layer (7) that reads on the instant charge separation layer; wherein one of the first and second photovoltaic layers is n-type and the other is p-type (see col. 2, line 48 through col. 3, line 31). It is the Examiner's position that said electrically conducting film (5) inherently provides ballistic transport of charge carriers from photovoltaic layer (3) to photovoltaic layer (7). The porous semiconductor layers can be nanometer

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dimensioned (see col. 3, lines 43-52). As seen in Figure 1, both said layers (3) and (5) are patterned (structured) with an uneven surface near layers (4) and (6), respectively, for increased surface area. The uneven surface near layers (4) and (6) can be considered light receiving surfaces since light can enter through both supports (1) and (9) (see Example 1 at cols. 6-7). It is the Examiner's position that Han's porous photovoltaic layer (3) and porous photovoltaic layer (7) are structurally identical to the instant light energy conversion layer and charge separation layer formed from template molecules. Han's porous photovoltaic layer (3), i.e., the light energy conversion layer, can further include a colorant, such as a merocyanine colorant, a xanthene colorant, or a metal (Fe) phthalocyanine colorant (col. 4, lines 13-29), which encompass the instant merbromin, o-phenylxanthene, iron cyanate, and organic dye. Han's photovoltaic cell provides the advantage of high photovoltaic efficiency (see col. 2, lines 3-5). It is acknowledged that the instant claims state that the conducting layer provides ballistic transport of charge carriers from the light energy conversion layer to the charge separation layer which eliminates the need for an electrolyte when producing electrical power from light that impinges upon the light energy conversion layer. However, such a statement does not exclude Han's electrically conductive film (5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated Han's structure into the solid state device for producing electrical power in the claims of said copending application because Han's photovoltaic device provides the advantage of high photovoltaic efficiency.

This is a provisional obviousness-type double patenting rejection.

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11. Claims 110 and 128 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3, 5, 7, 8, 13-19, 21, 23, 25, 31, 33-37, 42, 47, 50-56, 59, and 97-101 of copending Application No. 10/645,747 in view of Han, as applied to instant claims 97-109 and 111-127 above, and further in view of Lindmayer et al, U.S. Patent 3,949,463.

The claims of said copending application in view of Han, as relied upon for the reasons recited above, teach the limitations of instant claims 110 and 128, the difference being that the claims of said copending application in view of Han do not specifically teach the use of an antireflection coating. Lindmayer et al teaches that the efficiency of a solar cell is limited due to reflection of useful light striking the top surface of the solar cell (see col. 1, lines 28-31). To reduce this problem of light reflection, an antireflective coating is applied to the surface through which light enters the solar cell (see col. 1, lines 31-33). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have applied an antireflective coating to the light-receiving surfaces of the solid state device of the claims of said copending application in view of Han so as to reduce the problem of light reflection, as taught by Lindmayer et al.

This is a provisional obviousness-type double patenting rejection.

### ***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Skotheim (U.S. Patent 4,442,185) is hereby made of record. Instant claims 97-102, 105, 107-123, and 125-128 require that the conducting layer, which is an ultra-thin

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metal film, and the charge separation layer define a Schottky barrier; and that said conducting layer provides ballistic transport of charge carriers from the light conversion layer to the charge separation layer which eliminates the need for an electrolyte when producing electrical power from light that impinges upon the light energy conversion layer. Skotheim does not teach or suggest that said ultra-thin metal film conducting layer forms a Schottky barrier with a charge separation layer. Skotheim teaches an ultra-thin platinum film between n-type layer (131) (i.e., the light energy conversion layer) and highly conductive layer (134) (see Figure 13; and the paragraph bridging cols. 15 and 16). The platinum film maybe could form an n-barrier with highly conductive layer (134), which is actually a blend of a highly conductive polymer and a solid polymer electrolyte (col. 15, lines 33-50), but does not form such a barrier. Said platinum layer does not form a Schottky barrier with p-type layer (132), which is the charge separation layer. Even if n-type layer (131) was the charge separation layer, there would be no Schottky barrier between the n-type layer and the platinum layer. Skotheim teaches that there may be an additional layer of platinum, chromium or other metal (col. 16, lines 30-36), but there is nothing that leads a skilled artisan to the claimed invention.

Skotheim also does not teach or suggest a conductive layer and a charge separation layer define a metal-insulator-metal junction, as per instant claim 103. Instant claim 104 is distinguished from Skotheim since it requires that the charge separation layer comprises a semiconductor of a type, and the device further includes a semiconductor of the opposite type positioned between the charge separation layer and

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the conducting layer to provide an increased barrier height and photovoltage. Instant claims 106 and 124 are distinguished from Skotheim since they require that the charge separation layer comprises an insulator/semiconductor multi-layer.

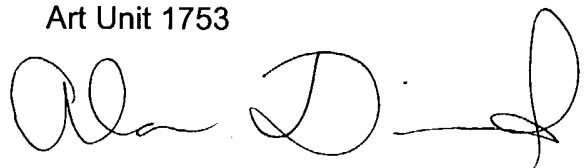
13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alan Diamond  
November 3, 2004

Alan Diamond  
Primary Examiner  
Art Unit 1753

A handwritten signature in black ink, appearing to read 'Alan D.', with a stylized flourish at the end.